LEARNING AND TEACHING MATHEMATICS: INTERPRETING STUDENT TEACHERS' VOICES

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CERTIFICATE

I certify that this thesis has not already been submitted for any degree and is not being submitted as part of candidature for any other degree.

I also certify that the thesis has been written by me and that any help that I have received in preparing this thesis, and all sources used, have been acknowledged in this thesis.

Signature of Candidate

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Sandra Schuck
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PREFACE

The following publications and conference papers developed from aspects of the research contained in this thesis:

Schuck, S. (1996). Reflections on the dilemmas and tensions in mathematics education courses for student teachers. *Asia-Pacific Journal of Teacher Education (formerly the South Pacific Jnl of Teacher Education) 24(1)* pp. 75-82.

Schuck, S. (1996). Chains in primary teacher mathematics education courses: An analysis of powerful constraints. *Mathematics Education Research Journal, 8(2)* (in press).

Schuck, S. (1996). Probing understanding of what it means to be a primary school teacher of mathematics. In S. Groves, J. Mousley, I. Robottom and R. Tytler (Eds.) *Contemporary Approaches to Research in Mathematics, Science and Environmental Education* (in press). Geelong, Victoria: Centre for Studies in Mathematics, Science and Environmental Education, Deakin University.

Schuck, S. (1995). The role of mathematics education courses in primary teacher education programs. In R. Hunting, G. Fitzsimons, P. Clarkson, & A. Bishop (Eds.), *Regional Collaboration in Mathematics Education 1995: Proceedings of ICMI International Conference* (pp. 511-620). Melbourne: ICMI.

Schuck, S. (1995). Forging links and breaking chains in primary teacher education: negotiating powerful ideas. In B. Atweh, S. Flavel (Eds.), *MERGA-18, Galtha: Proceedings of the Eighteenth Annual Conference of the Mathematics Education Research Group of Australasia* (pp. 465-470). Darwin: MERGA.

Schuck, S. (1995). Teaching and Learning Mathematics - Student Teachers' Perspectives. In S. Groves and R. Tytler (Eds.) *Contemporary Approaches to Research in Mathematics and Science Education*, pp. 169-173. Geelong, Victoria: Centre for Studies in Mathematics, Science and Environmental Education, Deakin University.

Schuck, S. (1995). *Using a research metaphor to stimulate mathematical thought.* Paper presented at the Mathematical Association of NSW Post-Secondary Mini-Conference, Sydney, March.

Schuck, S. (1994) *Mathematics education for student teachers: Disciplining the pedagogy.* Paper presented at the Australian Association for Research in Education Conference, Newcastle, November.

Schuck, S. (1993). Attitudes and beliefs of first year student primary teachers. Poster presented at the *Mathematics Education Research Group of Australasia 16th Annual Conference (MERGA 16)*, Brisbane, July.

Schuck, S. (1993). Attitudes and beliefs of pre-service primary teachers and their effect on learning. Paper presented to the *Special Interest Group on Adult Learning, MERGA 16*, Brisbane, July.

Schuck, S. (1993) Learning and teaching mathematics - Students' perspectives. Poster presentation at *DORP Poster session*, UTS (Broadway), November.

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ABSTRACT

This research study has investigated the beliefs that prospective primary school teachers hold about the epistemology of mathematics, and the teaching and learning of mathematics. In particular, it considered the following questions:

- What beliefs and attitudes about mathematics and mathematics education do first year primary school student teachers bring into their tertiary education?
- Are any of the students' beliefs about mathematics and mathematics education similar to the beliefs of the teacher educators in mathematics education and how do students interact with first year mathematics education subjects in the teacher education course?
- How do students' attitudes and beliefs influence their success in learning new mathematics at this stage of their lives?
- How do students' beliefs and attitudes affect their ideas on good practice in the teaching of mathematics in the primary school?

The research design was qualitative, using a case study investigation of 50 students in their first year of a teacher education course. The students' passage through the first year mathematics education subjects provided valuable insights into their beliefs, principally by means of interviews and open-ended questionnaires. The study was designed to have pedagogical outcomes for the students, by embedding the collection and interpretation of data in the teaching and learning of their course.

My personal perspective throughout this research has been that mathematics is a socio-cultural phenomenon, and that the learning of mathematics is achieved through the mediation of language, social interaction and culture. This perspective of mathematics and the learning of mathematics has influenced the choice of methodology and the research questions asked.

Results indicated that students often held two or more philosophies of mathematics and moved between these philosophies, depending on context. Further, students generally considered that the characteristics of a good teacher included being supportive and enthusiastic. Good pedagogy was believed to incorporate practical activities

demonstrating relevance, and providing "fun" for pupils. However, an alarming result was that having higher order knowledge about mathematics was often seen by the students as being a disadvantage for a teacher, principally because students believed such teachers would be less empathetic to struggling pupils.

These beliefs affected students' interactions with the first year university mathematics education subjects, as their beliefs about the importance of subject matter knowledge were at variance with the beliefs of the teacher educators. This dissonance led to devaluing of the mathematics education subjects by some of the students.

The study has led to the conclusion that a number of the students' beliefs about mathematics, and the teaching and learning of mathematics, should not be left unchallenged. Those beliefs dealing with ideas on good pedagogy should be strengthened, while beliefs about the nature of mathematics and the value of subject matter knowledge should be made more transparent and addressed. On the other side of the coin, teacher educators need to acknowledge the differences in the beliefs that student teachers and teacher educators might hold, and to consider ways of making mathematics education courses more relevant and meaningful for students.